WHAT IS CLAIMED IS:

1. A method for removing hydrogen peroxide and alkali hydroxide contaminants from a contaminated aqueous alkali chloride stream comprising

reacting the hydrogen peroxide and alkali hydroxide contaminants of the contaminated stream with chlorine gas and supplemental alkali hydroxide.

2. The method of claim 1, wherein the contaminants in the contaminated stream are contacted with said supplemental alkali hydroxide in a co-current manner, and with said chlorine gas in a counter-current manner.

3. The method of claim 1, wherein the contaminated stream comprises an alkali chloride selected from lithium chloride, sodium chloride, and potassium chloride.

4. The method of claim 2, wherein the contaminated stream is a spent alkali chloride recycle stream from a COIL apparatus.

5. The method of claim 2, wherein the contaminated stream is formed by the combination of a spent alkali chloride recycle stream from a COIL apparatus and a depleted anolyte stream from a chloralkali cell.

6. The method of claim 2, wherein the supplemental alkali hydroxide and chlorine gas are introduced at a molar ratio of between 1:2 and 1:4 (alkali hydroxide: Cl_2).

7. The method of claim 1, wherein the reactions take place in a packed column, and wherein the contaminated stream and supplemental alkali hydroxide streams are introduced to an upper region of the column, the chlorine stream is introduced to a lower region of the column, and a chloralkali cell feed stream of aqueous alkali chloride which is substantially free of alkali hydroxide and hydrogen peroxide is taken from a lower region of the packed column.

8. The method of claim 7, wherein said contaminated stream is formed by the combination of a spent alkali chloride recycle stream from a COIL apparatus and a depleted anolyte stream from a chloralkali cell.

9. The method of claim 8, wherein said anolyte is combined with said recycle stream prior to the introduction of the recycle stream to the top of the column.

10. The method of claim 8, wherein said anolyte and said recycle stream are combined by introducing both streams into the top of the column.

11. A method of recycling an alkali chloride solution from the spent fuel stream of a Chemical Oxygen-Iodine Laser (COIL) apparatus comprising

separating an aqueous alkali chloride stream having residual amounts of alkali hydroxide and H_2O_2 from the spent fuel of a COIL apparatus,

treating the alkali chloride stream by reacting the alkali hydroxide and H_2O_2 within said alkali chloride stream with Cl_2 and alkali hydroxide, both taken from a chloralkali cell,

supplying the treated alkali chloride stream to the chloralkali cell as an anolyte feed solution,

supplying a portion of the Cl_2 generated from the chloralkali cell to the COIL apparatus,

supplying a portion of the alkali hydroxide generated by the chloralkali cell to a peroxide generator in order to generate basic hydrogen peroxide (BHP) solution, and

supplying BHP solution from the peroxide generator to the COIL apparatus as a fuel feed stream.

12. The method of claim 11, further comprising combining a stream of depleted anolyte from the chloralkali cell with the alkali chloride stream.

13. The method of claim 12, wherein the depleted anolyte stream and alkali chloride stream are combined prior to treatment of the alkali chloride stream.

14. The method of claim 12, wherein the depleted anolyte stream and alkali chloride stream are combined subsequent to treatment of the alkali chloride stream.

15. A reactor for removing alkali hydroxide and hydrogen peroxide contaminants from an aqueous alkali halide stream, comprising

a reactor vessel;

an alkali hydroxide inlet in the upper region of the vessel;

a contaminated alkali halide inlet in the upper region of the vessel;

a chlorine gas inlet in the lower region of the vessel; and

a treated alkali halide outlet in the lower region of the vessel.

16. The reactor of claim 15, further comprising a depleted alkali chloride solution inlet in the upper region of the vessel.

17. A basic hydrogen peroxide (BHP) recycling system comprising

a chemical oxygen-iodine laser (COIL);

a separating apparatus which receives spent BHP from the COIL and separates the spent BHP into a purified alkali hydroxide / H_2O_2 stream, which is returned to the COIL, and an aqueous alkali chloride recycle stream having residual alkali hydroxide and H_2O_2;

a chloralkali cell;

a reactor which receives the alkali chloride recycle stream from the separating apparatus, a depleted anolyte stream from the chloralkali cell, a first alkali hydroxide stream from the chloralkali cell, and a first Cl_2 gas stream from the chloralkali cell, and which evolves a treated alkali chloride stream substantially free of alkali hydroxide and H_2O_2 which is supplied to the chloralkali cell and an oxygen off gas stream; and

a peroxide generator which receives a second alkali hydroxide stream from the chloralkali cell and produces a regenerated stream of BHP, which is supplied to the COIL,

wherein a second Cl_2 gas stream is supplied from the chloralkali cell to the COIL.

18. The system of claim 17, wherein the reactor is a packed column reactor having inlets in the upper region of the column for receiving the alkali chloride recycle stream, the depleted anolyte stream, and the first alkali hydroxide stream; an outlet in the upper region of the column for offgassing of oxygen; an inlet in the lower region of the column for receiving the first Cl_2 gas stream; and an outlet in the lower region of the column for the evolution of the treated alkali chloride stream.